Class #11
Feedforward Control
Notes

• Open Lab Time:
  – Fridays 10 am – 11 am
• Citing Sources in Lab Reports
• Report Authenticity
• Upcoming Labs:
  – Lab 18: Proportional-Integral Control
  – Lab 19: Feedforward Control
    • No pre-lab activity
Agenda

• Feedback: Interesting / Confusing
• Benefits/Problems with Feedback Control
  – Frequency Response
• Feedforward Control
  – Implementation
  – Challenges
• Model Uncertainty
Feedback

Most Interesting
• PID Implementation in Physical System
• Power of Matlab
• Doing Pole Analysis
• Math Behind Controller Design
• Review of ME3281

Most Confusing/Challenging
• Understanding PID Controllers
• Where the Plant & CL TF Come From
• What is Required in Lab
• Hardware Issues / Unmodeled Plant Dynamics
Motion Control Ex: Closed-Loop TF

\[ \text{Transfer function: } 3.9 \, s + 8 \]

\[ s^2 + 3.9 \, s + 8 \]

\[ \text{>> } \text{bode}(Gc) \]
Motion Control Ex: Feedforward Controller

\[ \text{Transfer function: } s^2 + 3.9 \, s + 8 \]

\[ \text{Bode Diagram} \]

\[ \text{Frequency (rad/s)} \]

\[ \text{Magnitude (dB)} \]

\[ \text{Phase (deg)} \]
Motion Control Ex: Full System TF

>> Gc = tf([3.9 8],[1 3.9 8])
Transfer function:
3.9 s + 8

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s^2 + 3.9 s + 8

>> Gff = tf([1 3.9 8], [3.9 8])
Transfer function:
s^2 + 3.9 s + 8

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3.9 s + 8

>> bode(Gff*Gc)